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ON THE THERAPY

OF THE

WATERS OF HOT SPRINGS;

Compliments

THEIR RELATION TO THE MEDICAL
PROFESSION AT LARGE.

BY

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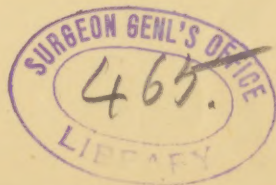
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ON THE THERAPY OF THE WATERS OF HOT SPRINGS, ARKANSAS,
AND THEIR RELATION TO THE MEDICAL PROFESSION AT LARGE.
By J. L. GEBHART, M. D., of Hot Springs, Ark.

Although this watering place is fast becoming a fashionable resort, up to the present time it has been exclusively resorted to by all classes, for the benefit of the curative qualities of the waters.

The number of visitors to these springs, during the last ten years, has increased at the rate of about one thousand per annum. During the year 1879 about twenty-five thousand visitors have visited the place, and about twenty thousand of that number have been invalids suffering with all forms of chronic diseases, of so obstinate a character that the patients themselves have despaired of procuring relief at the hands of the profession at home. Not more than one-fourth, or about five thousand of these were advised by their physicians at home to try these waters as a last resort; the physicians who do send their obstinate cases here are generally members of the profession who have themselves visited these springs and made their observations on the ground, or else have had some obstinate cases under their own treatment.—known the conditions of these patients both before and after their visit to these springs, and as a rule are the most eminent among their medical brethren at home. It is not claimed that the medical profession of Hot Springs are the superior of you gentlemen, or the profession at large, either in skill or attainments, but it is freely conceded that our equals, yea, our superiors in these respects are to be found in almost every part of our common country; neither is it true that there is to be found in these waters any specific for any disease whatever; *it is, however, claimed* that there are great curative agencies in these waters, that are not in the hands of the profession elsewhere, and all that the profession of Hot Springs have a right to claim, is the right to study these waters so as to use them to the best advantage,



since they are in a position to do so ; it then becomes our duty to explain to the profession at large what the curative factors are, their effects on the human system, their *modus operandi*, and in what pathological conditions they are indicated and contra-indicated, so far as our researches shall clearly warrant, leaving all doubtful points in abeyance for further research.

To discharge this duty to the best of my ability, in response to the resolution your association did me the honor to pass at your last meeting, asking me for a paper on this important subject, it is with pleasure that I submit the following views as the result of my observations and investigations, knowing well how easy it is to be mistaken in scientific research, particularly within unexplored fields ; I claim only the merit of candor and sincerity, earnestly inviting further investigation and criticism.

The most reliable chemical analysis that was ever made of these waters, was by that distinguished scientist, Professor Robert Dale Owen, in the year 1858, by the following process :

A large but definite quantity of the water of seven springs was separately treated and evaporated to dryness, the residue tested and determined by chemical reagents and gave only from eight to ten grains of solids to the gallon in the aggregate, with a considerable difference in the different springs relatively, and approximately as follows : viz.

	Grammes.
Organic matter combined with some moisture.....	1.16
Silica with some Sulphate of Lime, not dissolved by water.....	1.40
Bi-carbonate of Lime.....	2.40
Bi-carbonate of Magnesia.....	0.50
Chloride of Potassium.....	0.04
Chloride of Sodium.....	0.218
Oxide of Iron and a little Alumina.....	0.133
Sulphate of Lime dissolved by water.....	0.320
Loss. Iodine. Bromine.....	0.053
Total.....	6.254

This analysis it must be remembered does not even refer to any gaseous or volatile constituent, and if any active medical action is to be attributed to any or all of these constituents, it would only go to prove that the infinitesimal doses of our friends, the Homœopaths, are as yet heroic in size and require still further attenuation to become thoroughly efficient, no one in his sober sense will attribute any active medical qualities to such quantities of all of these comparatively inert constituents.

There are over fifty springs, discharging in the aggregate about five hundred thousand gallons per day, ranging in temperature from ninety to one hundred and fifty degrees of Fahrenheit's Thermometer. The water is perfectly clear and tasteless, and gives up all its solids within a few feet of its fountain head in the form of a calcareous rock called "tufa;" no one, however, as yet, has discovered a trace of silica (Si. O_2 .) in this tufa. Prof. Owen supposed that it was all carried off by the water of Hot Springs creek. This, however, I found was not the case, except in a limited degree; this tufa is not formed by a precipitation of the sediment of the solids, but the deposition occurs more like the process of electrolysis, but without the decomposition of the compounds, since it occurs only in rapid currents, jets or ripples, and each constituent is deposited by itself and in succession; first the iron, next lime, then magnesia and so on, where there is no current, a sedimentary deposit of soft creamy mud is invariably formed in the bottom of the undisturbed pools; bubbles of carbonic acid are continually discharging from out of the veins of the hot water at the bottom of these pools.

In the summer and fall of 1876 I engaged in a series of investigations with the following instruments: a Spectroscope of great dispersive power with the Rhumkurf induction coil, Becquerl electric apparatus, and other necessary adjuncts, a delicate universal Galvanometer, chemical apparatus, etc., with the following results:

Taking the specific gravity at the various temperatures of the waters of twenty-one different springs at every ten degrees of difference, I invariably found them to be much lighter than distilled water of similar temperature, the higher the temperature the greater the difference, when the gases and volatile constituents were expelled by ebullition, the solids then being precipitated, my figures of specific gravity coincided with distilled water, and I had simply pure distilled water giving me only Oxygen and Hydrogen spectrum lines, with scarcely perceptible flashes of Silicon lines; examining now the solids I had precipitated, I found them in all respects like the general character of the tufa deposited by electrolysis, as well as the mud in the pools, and *without a trace of silica.*

Now, this water when taken hot at the fountain head, invariably gives Silicon spectrum lines. The question naturally arose why the silica is absent in the tufa, mud and water after thor-

ough ebullition, and yet silica is always found when eliminated by chemical reagents. A treble distillate seemed to me to solve the problem by comparative spectra of reversal lines and dilutings until the lines paled into flashes and finally disappeared. [Here a description of the manipulation was given in detail.] This gave me proof of an excess of Hydrogen and Silicon with carbon in the distillate, leaving a clear inference that the distillate contained a hydride of silicon, the carbon probably remaining free in the form of carbonic acid, which I was unable to eliminate from the water in the first place except by chemical reagents, as this invariably resulted in showing silica, and, boiling, carried off the Silicon, it was deemed impracticable.

I was thus forced to the conclusion that a hydride of Silicon was present in this water, which might contain one equivalent of Carbon, and that this was decomposed by the presence of the reagents, liberating the Silicon to combine in the nascent state with two equivalents of Oxygen forming silica (Si. O^2). This was made public at the time.

Shortly before this time a discovery was made by some distinguished scientists of Europe that Silicon was capable of combining with Hydrogen in all the relations that carbon does, producing a Propyl, Ethyl, Heptyl and Nonyl, and shortly afterwards that one equivalent of Carbon could be made to combine with these various hydrides of silicon, constituting quite a large class of silicon compounds, the therapy of which so far as I know have never yet been accurately determined, except that some of them are known to be powerfully stimulant and alterative.

This compound, whatever it may by future research prove to be, I believe to be one of the active curative factors of the waters of Hot Springs. Quite a number of other experiments were made to determine this important question, all pointing with unmistakable force to the same conclusion, the recital of which the length of this paper forbids, other important subjects requiring our attention.

I have been thus explicit, and perhaps prosy, because some of my medical brethren of Hot Springs have attempted to disparage my investigations, although not one of these have ever bestowed a moment of time to the investigation of this subject.

Some of this water gives up its heat more rapidly at first on being exposed to the atmosphere and for a considerable time

afterwards than ordinary hot water. It must not be understood however that the heat in this water is claimed to be different from the heat of ordinary hot water, and yet this water, at one hundred and fifty degrees of temperature, does not boil any sooner, under exactly the same conditions of being heated, than distilled water does at seventy degrees. Here is a difference of eighty degrees. I mean that the hot water of these springs requires its heat to be raised sixty-two degrees to reach the boiling point (212°), while the other requires one hundred and forty-two degrees to reach the same point; and yet it is as easy to raise the temperature of the latter one hundred and forty-two degrees, while the former refuses to receive more than sixty-two degrees under exactly similar circumstances.

This can be explained only in two ways, by the principles of evaporation and correlation. I hold that both processes are in active operation. Nothing is better understood than the fact whenever a liquid changes to a vapor the vapor withdraws from the remaining liquid all its heat of vaporization, but this alone would necessarily require the presence of a sufficient quantity of volatile constituents to carry off eighty degrees of heat, while being heated up to place the two liquids upon an equality; and that is more than I would venture to claim, since some of my medical brethren deny even the existence of any volatile constituents at all.

The only remaining explanation left is by the correlation or metamorphosis of heat into some other form of energy; it is not questioned by any intelligent physician at this day, that all the operations of nature—all mutations or changes in matter, are directly traceable to correlations of energy, and as constantly as one form disappears another becomes evolved; and since we now know that light, heat, electricity, gravitation, cohesion, chemical affinity, and animal as well as vegetable vitality are all only different modes of motion, or in other words, different forms of energy constantly changing from one form into another, I have reason to believe that at least some of the heat in this water is correlated into electricity; the evidences are as follows:

Energy in any form is as indestructible as matter; its disappearance as heat cannot all be accounted for by radiation, conduction, and the vaporization of the water and volatile constituents; it must of necessity then be changed into some other form

of energy. Here the galvanometer comes to our aid and shows the presence of electricity in excess of the quantity found in ordinary hot water. It is well known that whenever a solid is taken up into solution, or given up by a solvent, electricity is generally evolved.

The galvanometer does not give the evolution of electricity before the hot water comes to the surface of the earth. This is demonstrated by the introduction of insulated conductors some distance up into the subterranean veins as compared to the reading of the instrument when connected with the same water at the surface of the earth.

From this I infer that the heat is correlated into electricity, not by chemical action, but probably by the action of the atmosphere on the water, causing it to part with its solids as well as its gaseous constituents.

The electricity evolved in this water is of such low tension that it produces no effect whatever when tested by the most delicate Electroscope, however great the quantity; and yet the Galvanometer responds quite readily.

The electricity most singularly disappears when a bather, whose functional action is stimulated into a state of exalted activity, is immersed in an insulated bathtub, as demonstrated by the comparative use of the meter with the bather in and out of it.

This I can explain only by recognizing the body of the bather as receiving either the heat of the water and correlating it into functional activity, (which is simply a manifestation of vital energy in one form) or else that the body receives electricity and correlates it into vital energy; I incline to the former theory; however this may be, such seems to be the effect on the bather, and I regard this *correlation of heat into vitality* as the greatest curative factor in the waters of Hot Springs.

The immediate effect of a bath of 98° temperature of this water, as compared to a bath of ordinary water of the same temperature is that this is very much more stimulant, exhilarating and eliminant, the heat of the body is raised from three to four degrees, the action of the heart is augmented both in force and frequency, often increasing the frequency twenty-five beats in a minute, all the secretory organs becoming roused into great activity—a feeling of pleasure and gladness—a modification of

pain and weariness, and a relaxation of muscular and ligamentary contraction.

The effects of a continued use of these baths are : remarkably great alterative action, correcting retrograde metamorphosis ; equalizing and moderating nervous excitability ; increased action of the entire absorbent system ; increased disintegration of tissue ; great increase of assimilation and reparation ; unparalleled activity of all the excretory organs, eliminating mineral blood poisons rapidly, such as lead, mercury and iodine, so rapidly that compounds of the two last named are here frequently prescribed and are often taken in heroic doses with almost perfect impunity ; eliminating also all effete and poisonous products of the disintegration of tissue by the kidneys and skin, and a material abatement of the morbid craving for alcohol and tobacco in those who have acquired the habit of the excessive use of these stimulants ; all of these therapeutic properties, more especially the alterative, are counteracted by the use of opium, tobacco and alcohol, the latter are forbidden to patients ; all these effects, as with nearly all other medical agents, are not strictly constant ; even where these waters seem to be clearly indicated, there is a small percentage of failures even at Hot Springs. In my opinion most of these failures are not due to a lack of virtues in these waters so much as to their mismanagement and indiscretions on the part of the patients themselves.

The pathological conditions in which these waters are indicated may be gathered and interpreted from the above given effects and therapeutical properties by any intelligent physician without a special enumeration of those morbid conditions in which these waters have acquired their world-wide reputation, with however this addition, that every character of pain that is not connected with any acute reaction is almost constantly and permanently but gradually relieved by their judicious administration.

One other effect I must refer to before I close this subject, which is quite unique in medical experience ; almost all senile infirmities seem to be postponed for a year or two. It is not unusual to see octogenarians put on juvenile airs ; this effect I attribute to correlation of heat into functional activity. To this same correlation I attribute also the unparalleled curative virtues of these waters in all forms of uterine diseases and their sequences.

Where doubts arise from peculiar or unusual conditions some reputable physician of Hot Springs should be consulted by mail through the attending physician at home, giving all details as far as possible.

The pathological conditions in which these waters are contra indicated are: Whenever the pulse is materially accelerated by the disease; an exalted action of the heart and arteries; where there is a tendency to active inflammation or any form of acute disease; where the action of the heart is in any way interfered with, either by structural change or the presence of liquid in the pericardium; where there is a marked increase of the temperature of the body; in hectic fever; in cancer, or any form of epithelioma; where there is a tendency to wasting hemorrhages, and with pregnant females.

The medical profession of Hot Springs do not desire, nor are they entitled to your patients when it is in your power to relieve them at home, but whenever you have not the curative factors at hand after thorough trial, then it becomes your duty to your patients as well as to yourselves, to advise a trial of the efficacy of these waters in all those cases in which their use is indicated. It is furthermore your duty to see that they get into the hands of a reputable physician for advice and treatment, and to escape those medical frauds who buy their patients openly from any of our hotels, and from paid ropers and steerers at a stipulated price per head, not for treatment and relief, but for downright robbery and malpractice.

It is unfortunately true that the efficient curative agents as well as the therapy of these waters are as mysterious as the source of the heat and of the waters themselves. It may also prove true in the future that where their use is now apparently contra-indicated they may prove to be equally efficient as in conditions wherein experience has already proved their efficacy. Careful and progressive experimentation should continue. Their use in varied limitations and modifications should be resorted to. Scientific experts should enter the field here for the sake of science and humanity. Government should lend its aid with unrestricted liberality. There should be here a great national sanitarium. The topographical possibilities for a beautiful city are infinite, and nature with open hand has laid broad the material foundations for the exhibition of the learning and philanthropy of the greatest and most liberal nation known to history.



